



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/643,638	08/18/2003	Peng Zhou	COOL-01500	4432
28960	7590	04/16/2009	EXAMINER	
HAVERSTOCK & OWENS LLP 162 N WOLFE ROAD SUNNYVALE, CA 94086			PETTITT, JOHN F	
ART UNIT	PAPER NUMBER			
	3744			
MAIL DATE	DELIVERY MODE			
04/16/2009	PAPER			

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/643,638	<b>Applicant(s)</b> ZHOU ET AL.
	<b>Examiner</b> John F. Pettitt	<b>Art Unit</b> 3744

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If no period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### **Status**

1) Responsive to communication(s) filed on 10 February 2009.  
 2a) This action is FINAL.      2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### **Disposition of Claims**

4) Claim(s) 1-7, 9-13, 20, 21 and 26-32 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-7, 9-13, 20-21, 26-32 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### **Application Papers**

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### **Priority under 35 U.S.C. § 119**

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### **Attachment(s)**

1) Notice of References Cited (PTO-892)  
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) Information Disclosure Statement(s) (PTO/SB/08)  
 Paper No(s)/Mail Date See Continuation Sheet

4) Interview Summary (PTO-413)  
 Paper No(s)/Mail Date \_\_\_\_\_

5) Notice of Informal Patent Application  
 6) Other: \_\_\_\_\_

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :05/21/2008, 09/09/2008, 09/09/2008, 09/29/2008, 10/27/2008, 10/27/2008, 02/13/2009, 02/20/2009.

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. **Claims 1, 4-7, 9-11, and 31-32** are rejected under 35 U.S.C. 102(e) as being anticipated by Tilton (US 2004/0089008 A1) hereafter Tilton which incorporates Tilton (US 5,220,804) hereafter Tilton(804).

**In regard to claim 1**, Tilton teaches a method of cooling at least one heat-generating device (12) using a sealed cooling system (10; interpreted as a closed cycle, wherein the refrigerant is substantially closed from the environment), the method comprising the steps of: using at least one pump (40) to cause a fluid (coolant) to flow in a sealed cooling system (10) including at least one heat exchanger (50), wherein the at least one heat exchanger (50) includes a plurality of channels (see both Fig. 1-2, additionally the incorporated heat exchanger (50) is described by Tilton(804) as having array (40) as well as channels 56 both of which provide a plurality of channels) through which fluid flows; and adjusting a pressure of the flowing fluid (paragraph 77) to correspondingly adjust a boiling point temperature of the fluid in the at least one heat

exchanger (50; inherent to changing the pressure - the relationship between the temperature and pressure is an inherent property of a refrigerant and if one changes the pressure the saturation temperature will inherently be adjusted or changed), wherein any gas (interpreted as a gas, such may be any type or composition; vapor coolant - parag. 65 - when coolant is sprayed onto hot semiconductor, coolant becomes two-phase or boils creating both vapor and liquid coolant) and the fluid (liquid coolant) remain sealed within the sealed cooling system (the coolant is re-circulated and both phases are retained within the cooling system 10; see Figures); wherein the pressure of the flowing fluid is adjusted by dynamically adjusting a fluid flow rate in the at least one heat exchanger (paragraph 77) in response to a changed property of the heat-generating device or the cooling system (controller responds to pressure and temperature of the fluid and maintains such to provide sufficient cooling; additionally pump adjusts pressure and flow rate in response to changed control signals of the controller which would represent a changed property of the cooling system).

**In regard to claim 4,** Tilton teaches providing at least one heat rejector (condenser 30) for rejecting heat from the system to ambient air (paragraph 60), the at least one heat rejector (30) being situated downstream of the at least one heat exchanger (50; see Figures; X is downstream of Y is interpreted as X is after Y with relation to the flow direction of the fluid).

**In regard to claim 5,** Tilton teaches providing a reservoir (25) that accommodates a volume of the gas in the system generated during boiling (reservoir 25

has a volume and is fluidly connected to the spray module 50, therefore the reservoir inherently accommodates - has room for - the gas generated in 50).

**In regard to claim 6**, Tilton teaches that the reservoir (25) reduces a change in pressure of the fluid that occurs during boiling (the volume of the reservoir inherently reduces increases in pressure due to boiling since the volume available for the gas is increased by the volume of the reservoir; additionally, paragraph 53 explicitly teaches that the reservoir reduces pressure variations during high vapor production).

**In regard to claim 7**, Tilton teaches that the reservoir (25) is situated downstream of the at least one heat rejector (30) (see Figure 2).

**In regard to claim 9**, Tilton teaches that the reservoir (25) reduces a change in pressure of the fluid that occurs during boiling (the volume of the reservoir inherently reduces increases in pressure due to boiling since the volume available for the gas is increased by the volume of the reservoir; additionally, paragraph 53 explicitly teaches that the reservoir reduces pressure variations during high vapor production).

**In regard to claim 10**, Tilton teaches that the reservoir (25) having an inlet (received on top in figure 2) coupled to a fluid outlet port (shown on right side of 30) of the at least one heat rejector (30) via a first portion (portion between 30 and 25) of a fluid transport line (line between 25 and 30 and 40) and an outlet (on left side of reservoir 25) coupled to a fluid inlet port (shown received at bottom part of pump 40) of the at least one pump (40) via a second portion (portion between 40 and 25) of the fluid transport line.

**In regard to claim 11**, Tilton teaches that the reservoir (25) is integrated with (interpreted as connected with) the at least one heat rejector (30) and the at least one pump (40; lines between components connect the reservoir heat rejector and pump - Figure 2; in addition Figure 3 teaches that the heat rejector 30, reservoir 25, and pump 40 are also connected with one another).

**In regard to claim 31**, Tilton teaches that the step of a pressure of the fluid comprises adjusting the pressure of the fluid during a charging and sealing of the system (paragraph 79; the pressure of the refrigerant is inherently based on the amount of fluid provided to the cooling system; as refrigerant is stored into the cooling system the pressure of the fluid will inherently be adjusted or changed as it flows from a source to the cooling system).

**In regard to claim 32**, Tilton teaches that the step of adjusting a pressure of the fluid comprises adjusting a composition and volume and combinations thereof a gas and liquid and combinations thereof introduced during charging of the system (paragraph 79).

3. **Claims 1-3, 12, 27-28, and 31-32** are rejected under 35 U.S.C. 102(e) as being anticipated by Cader et al. (US 6,836,131) hereafter Cader.

**In regard to claim 1**, Cader teaches a method of cooling at least one heat-generating device (DUT - column 1, lines 50-55, 60) using a sealed cooling system (Figures 6 and 8), the method comprising the steps of: using at least one pump (665, 680, 865, 890) to cause a fluid (coolant, column 8, lines 35-40, 57) to flow in the sealed cooling system including at least one heat exchanger (spray chamber), wherein the at

least one heat exchanger (50) includes a plurality of channels (515, 615, 815 and so forth, column 7, lines 35-40) through which fluid flows; and adjusting a pressure of the flowing fluid (column 9, lines 25-30) to correspondingly adjust a boiling point temperature of the fluid in the at least one heat exchanger (spray chamber; inherent to changing the pressure - the relationship between the temperature and pressure is an inherent property of a refrigerant and if one changes the pressure the saturation temperature will inherently be adjusted or changed; also expressly taught - column 9, lines 20-25), wherein any gas (interpreted as a gas, such may be any type or composition; vapor coolant - column 8, lines 35-40; column 9, lines 35-40 - when coolant is sprayed onto hot electrical device DUT, coolant becomes two-phase creating both gas and liquid) and the fluid (liquid coolant) remain sealed within the sealed cooling system (the coolant is re-circulated and both phases are retained within the cooling system, column 8, lines 60-67); wherein the pressure of the flowing fluid is adjusted by dynamically adjusting a fluid flow rate in the at least one heat exchanger (spray chamber; column 9, lines 25-30) in response to a changed property (coolant pressure- column 9, line 27 and temperature 640- column 9, line 37; column 9, line 10 - temperature of the heat generating device - DUT; and temperature of the heat exchanger - spray chamber - 645 - column 9, line 37) of the heat-generating device or the cooling system.

**In regard to claim 2**, see claim 1.

**In regard to claim 3**, Cader teaches the step of adjusting a pressure of the fluid comprises dynamically adjusting a size of a fluid flow path orifice (interpreted as

changing a size of an opening relative to another size or relative to something else such as time; making changes to the sizes and number of the spray nozzles - column 10, lines 25-30 in fabrication at least, and certainly during testing/operation with the device-for different applications-column 8, line 50, which changes occur in time and relative to other operating parameters) coupled to the at least one heat exchanger (spray chamber) in response to: changes in temperature of the fluid (column 10, lines 25-30; and thereby inherently changing the pressure within the chamber; in response to the temperature of fluid when operating with different sized and numbered spray nozzles for obtaining differing performing devices).

**In regard to claim 12**, Cader teaches that the system is hermetically sealed (interpreted as sealed such that air may not trespass, column 10, lines 47-48; column 8, lines 60-67).

**In regard to claim 27**, Cader teaches providing sensors (620, 640, 645, 822, 845) to adjust the fluid flow from the at least one pump (865, 665; column 9, line 25-35; column 10, lines 55-60).

**In regard to claim 28**, Cader teaches that the sensors (645 and/or 620) are coupled to the at least one heat exchanger (spray chamber).

**In regard to claim 31**, Cader teaches that the step of adjusting a pressure of the fluid comprises adjusting the pressure of the fluid during a charging and sealing of the system (column 8, lines 60-67; the pressure of the refrigerant is inherently based on the amount of fluid provided to the cooling system; as refrigerant is stored into the cooling

system the pressure of the fluid will inherently be adjusted or changed as it flows from a source to the cooling system).

**In regard to claim 32,** Cader teaches that the step of adjusting a pressure of the fluid comprises adjusting a composition (column 8, lines 50, 56) introduced during charging of the system.

4. **Claims 1-2, 20, and 26-32** are rejected under 35 U.S.C. 102(b) as being anticipated by Jiang ("Closed-Loop Electroosmotic Microchannel Cooling System for VLSI") hereafter Jiang.

**In regard to claim 1,** Jiang teaches a method of cooling at least one heat-generating device (IC Chip) using a sealed cooling system (Fig. 1), the method comprising the steps of: using at least one pump (electro-osmotic pump) to cause a fluid (refrigerant-water) to flow in the sealed cooling system including at least one heat exchanger (two-phase microchannels heat exchanger), wherein the at least one heat exchanger (two-phase microchannels heat exchanger) includes a plurality of channels (page 6, parag. 2 and page 3) through which fluid flows; and adjusting a pressure of the flowing fluid (pump adjusts pressure of fluid - page 9 last paragraph) to correspondingly adjust a boiling point temperature of the fluid (such pressure adjustment by pump inherently changes the saturation temperature of the fluid) in the at least one heat exchanger (two-phase microchannels heat exchanger), wherein any gas (interpreted as a gas, such may be any type or composition; vapor coolant; as heating of the refrigerant forms vapor from liquid) and the fluid (liquid) remain sealed within the sealed cooling

system (page 9, 2<sup>nd</sup> paragraph- closed system; further note that the other experimental setups may also be considered to operate such that a gas and the fluid remain sealed within the system as no leakage occurs); wherein the pressure of the flowing fluid is adjusted by dynamically adjusting a fluid flow rate in the at least one heat exchanger (pump power is adjusted-Figure 12 in time and also relative to other operating parameters in order to make the measurements shown) in response to a changed property (temperature of chip) of the heat-generating device or the cooling system (in order to obtain the performance operating curves shown in Fig. 12).

**In regard to claim 2**, Jiang teaches that the step of dynamically adjusting the fluid flow rate comprises adjusting the operating conditions (input power) of the at least one pump (electro-osmotic pump) in response to changes in pressure of the fluid (when pressure drops are recorded then the pump's next power level is operated); and changes in temperature of the fluid (see Figure 11; as when temperature changes are recorded then the pump's next power level is operated).

**In regard to claim 20**, Jiang teaches that the fluid is an inorganic (interpreted as anything not containing carbon; water).

**In regard to claim 26**, Jiang teaches water (page 9 under closed loop system performance).

**In regard to claim 27**, Jiang teaches providing sensors (temperature and pressure sensors - page 9 under section 4) to adjust the fluid flow from the at least one pump (electro-osmotic pump) in order to gather the data.

**In regard to claim 28**, Jiang teaches that the sensor (pressure, temperature, flow rate; p.9) are coupled to the at least one heat exchanger (two-phase microchannel heat exchanger).

**In regard to claim 29**, see claim 1.

**In regard to claim 30**, Jiang teaches delivering to a catalytic recombiner (recombiner-page 23 and page 8-electro-osmotic pump) a gaseous stream containing hydrogen being discharged from a downstream side of the at least one pump (electro-osmotic pump) together with an amount of oxygen generated from an upstream side of the at least one pump (electro-osmotic pump) sufficient to convert the hydrogen and oxygen to water, the catalytic recombiner coupled to an inlet port of the at least one pump (see figure 8 - recombiner is coupled to overall structure of pump and near inlet; Further statement on page 9, lines 1-2 that recombiner recombines the gas generated during electrolysis-inherently teaches the combination of oxygen and hydrogen from all locations where these components are generated).

**In regard to claim 31**, Jiang teaches that the step of adjusting a pressure of the fluid comprises adjusting the pressure of the fluid during a charging and sealing of the system (the pressure of the refrigerant is inherently based on the amount of fluid provided to the cooling system; as refrigerant is stored into the cooling system the pressure of the fluid will inherently be adjusted or changed as it flows from a source to the cooling system).

**In regard to claim 32**, Jiang teaches that the step of adjusting a pressure of the fluid comprises adjusting a (volume; page 9) introduced during charging of the system

(the pressure developed by the pump is inherently dependent on the amount and type of coolant charged in the system).

**5. Claims 1-3, 20, and 26-32** are rejected under 35 U.S.C. 102(b) as being anticipated by Koo.

**In regard to claim 1**, Koo teaches a method of cooling at least one heat-generating device (IC Chip) using a sealed cooling system (Fig. 1), the method comprising the steps of: using at least one pump (electro-kinetic pump) to cause a fluid (refrigerant-water) to flow in the sealed cooling system including at least one heat exchanger (microchannel heat exchanger), wherein the at least one heat exchanger (microchannel heat exchanger) includes a plurality of channels (microchannels) through which fluid flows; and adjusting a pressure of the flowing fluid (pump adjusts pressure of fluid - page 426 in order to obtain the data) to correspondingly adjust a boiling point temperature of the fluid (such pressure adjustment by pump inherently changes the saturation temperature of the fluid) in the at least one heat exchanger (microchannel heat exchanger), wherein any gas (vapor refrigerant; interpreted as a gas, such may be any type or composition; heating of refrigerant and forming vapor from liquid - p. 425, second column) and the fluid (liquid) remain sealed within the sealed cooling system (inherent to closed system, further the system is not leaking refrigerant); wherein the pressure of the flowing fluid is adjusted by dynamically adjusting a fluid flow rate in the at least one heat exchanger (pump power is adjusted-Figure 9 in time and also relative to other parameters to gather data) in response to a changed property (pressure- in

recording pressure drop across heat exchanger) the cooling system (in order to obtain the performance operating curves shown in Fig. 9).

**In regard to claim 2**, Koo teaches that the step of dynamically adjusting the fluid flow rate comprises adjusting the operating conditions (power to pump) of the at least one pump (electro-osmotic pump) in response to changes in pressure of the fluid (see Figure 9; when pressure drops are recorded then the pump's next power level is operated).

**In regard to claim 3**, Koo teaches the step of adjusting a pressure of the fluid comprises dynamically adjusting a size of a fluid flow path orifice (interpreted as changing a size of an opening in time or relative to another size; making changes to the number and width of the channels - Figure 8 in fabrication at least, and certainly during experimentation with the device to produce figure 8) coupled to the at least one heat exchanger (microchannels heat exchanger) in response to changes in pressure of the fluid (pressure drop).

**In regard to claim 20**, Koo teaches that the fluid is an inorganic (interpreted as anything not containing carbon; water).

**In regard to claim 26**, Koo teaches water (page 426 under conclusion).

**In regard to claim 27**, Koo teaches providing sensors (temperature and pressure sensors - inherent to obtaining data in Fig. 5-6) to adjust the fluid flow from the at least one pump (electro-kinetic pump).

**In regard to claim 28**, Koo teaches that the sensor (pressure, temperature, and flow rate, p. 426) are coupled to the at least one heat exchanger (microchannel heat exchanger).

**In regard to claim 31**, Koo teaches that the step of adjusting a pressure of the fluid comprises adjusting the pressure of the fluid during a charging and sealing of the system (the pressure of the refrigerant during operation is inherently based on the amount of fluid provided to the cooling system; as refrigerant is stored into the cooling system the pressure of the fluid will inherently be adjusted or changed as it flows from a source to the cooling system).

**In regard to claim 32**, Koo teaches that the step of adjusting a pressure of the fluid comprises adjusting a volume (p. 426) introduced during charging of the system (the pressure developed by the pump is inherently dependent on the amount and type of coolant charged in the system).

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

Art Unit: 3744

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over the obvious modification of Cader. Cader teaches all the limitations of claim 13 but does not explicitly teach that the sealed system of Cader is capable of preventing a change in the pressure under a given set of pump, ambient temperature, and heating conditions varies by less than 1 psi during a five year lifetime. However, Cader teaches that the cooling system is sealed and that the pressures within the system may be maintained at above and below atmospheric pressures. It is old in the art to make cooling systems hermetic. Further, basic domestic refrigeration systems are routinely designed and fabricated to avoid leaking any refrigerant (including an amount that would result in a system pressure drop of 1 psi) over a period of 5 years and longer. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made,

to ensure that the system components could maintain the sealed nature of the system for greater than 5 years.

9. **Claim 21** is rejected under 35 U.S.C. 103(a) as being unpatentable over Jiang in view of Chordia (US 2004/0250994) hereafter Chordia. Jiang teaches all the limitations of claim 1 but does not teach using carbon dioxide. Chordia teaches the use of carbon dioxide as a suitable coolant for microdevices. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to employ carbon dioxide as the coolant within the electro-osmotic pumping system of Jiang for the purpose of providing a super-critical refrigerant (paragraph 21, 9) for the purpose of obtaining low viscosity of the fluid and hence low resistance to fluid flow, making it possible to pump more fluid for a given power or pumping the same amount of fluid for less power, thus improving system performance.

*Response to Arguments*

10. Applicant's arguments filed 10/27/2008 have been fully considered but they are not persuasive.

1. Applicant's arguments (page 8, ¶ 2) are that the device of Tilton is not sealed such that a gas and the fluid remain sealed within the sealed cooling system because such would require that none of the refrigerant to be lost and that such is impossible. In response to the applicant's arguments, the examiner disagrees with the applicant's premise that the closed recirculation system taught by Tilton may not be considered to maintain a gas (vapor refrigerant) within the system because the system is disclosed as

permits air to escape. The closed recirculation system is considered sealed and is further considered to maintain the vapor refrigerant; otherwise the system would not be expected to operate over time. Further, why would there be a need for operating a pressure relief valve (parag. 58) if the system were not sealed. Therefore, the applicant's arguments are unpersuasive.

2. Applicant's arguments (page 8, ¶ 3) are that the amended limitation overcomes the teachings of Tilton. In response to the applicant's arguments, the examiner fully disagrees and directs the applicant to the rejection above and further notes that any gas may be the vapor refrigerant and that the recitation, "any gas" does not have to mean "all gas". Further, it is noted that it appears that the applicant has support only for the recitation, "any gas" in the specification.

3. Applicant's arguments (page 9, ¶ 1, page 10, ¶ 2) are a response to the arguments presented by the final rejection dated 06/02/2008 in which the applicant's argument rests entirely on the contradiction argument "there is no support for this conclusion". In response to the applicant's arguments, the examiner disagrees and notes that mere contradiction is not a persuasive argument. Further, it is noted that the argument that the claim limitation, "adjusting a pressure of the flowing fluid to correspondingly adjust a boiling point temperature of the fluid" can not be met unless the adjustment in pressure be performed for the express purpose of adjusting the boiling point of the coolant, is unpersuasive as to perform the limitation the reference need only change the pressure and change the temperature. As stated before, such is

inherent to changing the pressure of a two-phase fluid as the pressure and temperature are dependent on one another and not separately variable.

4. Applicant's arguments (page 10, ¶ 3-4) are an allegation that the amended limitation overcomes the teachings of Cader. In response to the applicant's arguments, the examiner disagrees and directs the applicant to the rejection above.

5. Applicant's arguments (page 11, ¶ 1) are an allegation that dynamically adjusting a size of a fluid flow path orifice is not performed by Cader. In response to the applicant's arguments, the examiner disagrees and notes that such is inherently performed by fabricating the system and further by testing/operating the system as disclosed (column 8, line 50).

6. Applicant's arguments (page 11, ¶ 3, page 12, ¶ 3) are an allegation that Koo does not show that the fluid flow rate is adjusted in response to changed parameters of interest. In response to the applicant's arguments, the examiner fully disagrees as this is inherent to experimentation and gathering data - one must adjust the flow rate in order to get different flow rate measurements and one must do so in response to the pressure of the fluid as the pressure is what is being measured to obtain the pressure drop in Fig. 9, therefore, an argument that the fluid flow rate is not changed in response to a change in pressure ignores the fact that the change in the pressure is what is desired from the experiment and therefore is the basis for changing the fluid flow rate.

7. Applicant's arguments (page 13, ¶ 1) are an allegation that Jiang does not teach adjusting a pressure of the fluid in response to a changed property. In response to the applicant's arguments, the examiner disagrees on the same grounds as provided

for Koo and further notes that measuring pressure is inherent to measuring pressure drop and therefore, the applicant's allegations concerning pressure drop are unpersuasive.

***Conclusion***

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to /John Pettitt/ whose telephone number is 571-272-0771. The examiner can normally be reached on M-F 8a-4p.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on 571-272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/John F Pettitt /  
Examiner, Art Unit 3744

JFP III  
March 31, 2009

/Cheryl J. Tyler/  
Supervisory Patent Examiner, Art  
Unit 3744